

Effects of Copper on Mechanosensory Structures in Developing Fish Embryos and Larvae

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Abstract

Copper is a common contaminant in urban stormwater runoff. There are many sources of copper in urban watersheds, including residential pesticide use, vehicle brake pads, and stormwater drainage systems. It has previously been shown that copper is highly toxic to ciliated sensory neurons in fish, and the periodic transport of copper to surface waters could impair the health and survival of salmonids or other fish species that spawn in urbanized habitats. In the present study we use the zebrafish (*Danio rerio*) as a surrogate model to examine the effects of copper on the development and function of the lateral line system in fish. We used in vivo fluorescent imaging in combination with a vital dye (DASPEI) that stains ciliated lateral line neurons and neuromasts to examine the impacts of copper on the development of ciliated mechanosensory neurons. We find that short-term copper exposures at concentrations that are representative of urban stormwater runoff in Puget Sound streams are sufficient to induce cell death and a loss of peripheral sensory structures in developing zebrafish. Consequently, short-term exposures to copper in urban stormwater runoff may impair a sensory system that plays an essential role in orientation, schooling, and predator avoidance in salmon and other fish species.